

Highlights

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* MISSILE MAIL?

* SOLID PROPELLANTS

* ANTI-MISSILE RESEARCH

* LAB EQUIPMENT WANTED

* SPACE SCIENCE RESEARCH

* DIELECTRIC RESEARCH

* MAGNETIC TAPE RESEARCH

* PUBLICATION CHECKLIST

Washington SCIENCE TRENDS

MISSILE MAIL PROGRAM

Postmaster General Arthur E. Summerfield has written to Defense Department officials proposing the use of Chance Vought Regulus or Northrup Snark air-breathing missiles for experimental transportation of mail within the United States. A Post Office spokesman told Washington SCIENCE TRENDS that the first flights are expected to be carried out "before the end of this calendar year."

Both missiles have made numerous long-distance flights and are equipped to be brought back for re-use by means of landing gear or skids. Future procurement of both missiles has been canceled and a number of vehicles could be made available for mail-carrying experiments.

SOLID PROPELLANT RESEARCH

Advanced Research Projects Agency reports it is engaged in a "Major program" designed to bring about important improvements and advances in solid-propellant chemistry through discovery of new chemical compounds development of practical methods of synthesis and more efficient usage. Initial objective is development of solids having specific impulses 10 to 20 percent higher than now available.

* Major contracts -- ARPA has awarded four major contracts for comprehensive research. This work involves ingredient synthesis studies, thermochemistry thermodynamics and performance calculations, propellant formulation, property investigations and necessary related chemical engineering and research.

* Specialized Research Contracts -- ARPA sponsors industrial research contracts to "exploit some particular specialized skill" in the field of high-energy ingredients and propellants synthesis, combustion, kinetics and high-temperature tolerance of inert compounds. Also included are performance calculations and the supporting research necessary to permit effective use of new high-energy materials when they become available.

* Basic research -- ARPA is supporting basic research through contracts with universities and nonprofit organizations. Work is aimed toward better understanding of the basic chemistry and thermochemistry of elements most likely to be used in high performance solid propellants.

* Government research -- ARPA sponsors work in Government laboratories, including studies of synthesis, engine-cooling techniques, detonation, thermochemistry, and new compound evaluation and characterization.

Ballistic Missile Defense

ARPA Director Roy Johnson believes that major questions concerning defense against ballistic missiles must be solved before the detailed components necessary for detection, identification, tracking and kill can be fully developed.

Research, according to testimony to the House Committee on Science and Astronautics, is directed along these fields:

Re-Entry Measurements -- Work on measurements of nose-cone re-entry is taking place at the Atlantic Missile Range and the National Aeronautics and Space Administration Range at Wallops Island, Va. Included is Project Dam, the instrumentation of a converted Liberty ship for observation of firings from Florida coast. A motor yacht Acania, its location not specified, has been equipped with a large variety of radar equipment for the same general purpose. Research radars are being installed at Wallops Island to observe small rocket firings and aircraft are being instrumented with optical and infrared equipment.

Component Requirements -- "Major state-of-the-art improvements" are held necessary in the fields of radar and data processing. In general, these needs are outlined:

* Radar -- "It is considered necessary to develop high capacity, high-resolution, high accuracy systems of very large range. ...The laws of physics state that a 10-times increase in range requires a 10,000 fold increase in power of the radar. Thus, these radars are both very large and very powerful. As a consequence they are also very expensive....."

* Radar Techniques -- Defense Department is sponsoring a number of investigations in radar techniques. These include studies of ways to measure very small differences in distances while at the same time using very high power, also methods of handling the tremendous amount of data coming from long range radar, - and which can distinguish between objects a few feet apart.

* Data Processing -- Data processing problems include a high-speed reduction of vast amounts of radar and other sensory data, calculation of trajectories, weapon assignment, transmission of data over large distances at high speeds, and Anti-ICBM guidance. Congress was told that one of the most serious phases of the data-handling problem is that of deciding when to release the defensive missile. A decision must be made within a very few minutes of first warning as to whether or not an attack is in progress.

NIKE ZEUS PROGRAM: William Holaday, Defense Secretary McElroy's guided missile adviser, has recommended adding some \$40 million to the controversial Nike-Zeus anti-missile program "to permit engineering development work on certain pieces of mechanical equipment, such as machines to automatically produce transistors and resistors." He believes "the country just does not have enough billions...to make these by hand."

GOVERNMENT AIDS TO SCIENCE

Laboratory Equipment Wanted

National Science Foundation will support "meritorious" proposals from scientists and science teachers in college, universities and non-profit organizations for design and construction of new or improved laboratory equipment or instructional materials.

The proposals may cover lecture demonstrations, laboratory or field work for courses at elementary, secondary and undergraduate levels in mathematics, astronomy, earth sciences, physical and biological sciences and engineering.

How may proposals be submitted? Foundation says proposals must be signed by the project director and a responsible official, should clearly describe the work to be done, the qualifications of the personnel involved and should show how the proposed material will be evaluated and eventually made generally available. A detailed budget should be included.

Will purchase of equipment be supported? The Foundation will not provide for the purchase of equipment for refurbishing school and college laboratories or for commercial production of equipment and materials.

How much will be spent? Between \$100 and \$200 thousand for the current Fiscal Year, perhaps more in the future.

Where can applications be sent? Proposals or requests for further information should go to the Course Content Improvement Section, Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D.C. Proposals may be submitted at any time but those to be considered for support during the current Fiscal Year must be sent before April 15, 1959.

Space Science Research

National Aeronautics and Space Administration is joining with the National Academy of Sciences to sponsor a new program of research appointments for scientists of "exceptional creative ability" in the field of theoretical and experimental physics associated with space exploration.

What appointments are available? The program includes Research Associateships at the post-doctoral level with stipends beginning at \$8,000 per year. In addition, Senior Research Associateships with increased stipends will be available for experienced scientists with "substantial records of accomplishment."

What areas will be covered? Program covers theoretical research in physics of planets and satellites, astrophysics and plasma physics. Experimental research will cover fields and particles, planetary atmospheres, astronomy, solar physics and meteorology.

Where can applications be sent? Applications must be received by April 30, 1959. Requests for application forms and further information should go to Fellowship Office, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington 25, D.C.

RESEARCH CHECKLIST

() Dielectric Constants: Studies at the National Bureau of Standards have resulted in a redetermination of the dielectric constant of deuterium oxide or heavy water. The measurements were made with a high degree of accuracy through an improved a-c bridge technique. Accurate data on the dielectric constants of pure liquids are of fundamental importance for a variety of scientific and industrial purposes.

(Report available. Free. Write National Bureau of Standards, Office of Technical Information, Washington 25, D.C. for Summary Tech. Report No. 2304)

() Antenna Research: Studies at the Naval Research Laboratory are directed toward the development of microwave antennas which permit rapid scanning without movement of the antenna structure. An array of circularly polarized elements is used, with required phase shifts obtained through rotating circularly polarized radiators. Scanning an array is achieved by properly programming the speed of rotation.

(Details from Electronics Division, Microwave Antennas and Components Branch, U.S. Naval Research Laboratory, Washington, 25, D.C.)

() Satellite Research: Engineers at the National Aeronautics and Space Administration Langley (Va.) Research center propose a 100 foot inflatable sphere to be placed in a 1000 mile orbit for use as a "handyman" satellite to relay radio and television signals, help mariners chart their courses and perform other "odd jobs." An aluminum-coated plastic is suggested.

(Details from ASME, 29 W. 39th St., N.Y. 18, N.Y. Ask for Paper No. 59-AV-38. Price, 80 cents)

() Fuel and Lubricant Research: Studies at Stanford Research Institute sponsored by the U.S. Air Force are designed to provide background information on the effects of high energy, high intensity electromagnetic radiation on organic liquids. The information obtained will be used in development of radiation-resistant lubricants and hydraulic fluids for nuclear-propelled aircraft.

(Report available. Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 131 936. 55 pages. \$1.50)

() Electromagnetic Relay: Research by P.R. Mallory and Co. for the Wright Air Development Center has led to development of a novel relay said to be suitable for low-cost, automatic fabrication and assembly. The device reportedly operates in temperatures from -65 to 125°C. The research was part of a study of printed circuit methods for relay applications.

() Magnetic Tape Research: National Bureau of Standards is investigating for the U.S. Air Force the performance of magnetic tape used in recording data transmitted by missiles and satellites. The Bureau is seeking "adequate" standardization tests to permit control of tape quality and in some measure guarantee tape performance. Researchers report that progress has been made in developing a new method of magnetic testing which allows tape to be evaluated without reference to an individual recording machine.

(Report available. Free. Write National Bureau of Standards, Office of Technical Information for Summary Tech. Report No. 2318)

() Lead Recovery Research: Investigations by metallurgists of the U.S. Bureau of Mines has led to a "significant advance" toward developing a method of recovering sulfide lead now lost in ultrafine particles of discarded ore. The researchers believe substantial savings are possible if lead recovery is "only a few hundredths of one percent."

(Report available. Free. Write Publications-Distribution Section, Bureau of Mines 4800 Forbes Avenue, Pittsburgh, 13, Pa. for Report of Investigations No. 5444)

() Radioactive Fallout Research: Atomic Energy Commission is currently evaluating results of experiments during the Operation Hardtack series of weapons tests which were designed to reduce assimilation of strontium-90. Tons of silica sand were placed on firing barges in the thought that strontium-90 would be incorporated into glass-type insoluble beads, thereby reducing assimilation by plants and animals.

(Report available. Write Information Services, Atomic Energy Commission, Washington 25, D.C. for Radioactive Fallout by Dr. Willard F. Libby, dated March 13, 1959)

() Computer Research: Studies by the National Cash Register Co. for the Air Force has led to development of magnetic core logic circuits said to provide small size and high reliability. The devices are described as potentially useful in magnetic digital computer systems. The study also included the application of phosphor-photoconductor elements to digital computers.

(Report available. Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 151 257. 51 pages. \$1.50)

() New Nickel Oxide Standard: A new standard sample of nickel oxide powder is now available from the National Bureau of Standards. The sample is intended for checking and calibrating spectrochemical and chemical methods employed in the analysis of high purity nickel, particularly electronic-grade and electrolytic nickel for spark plugs, thermionic devices and other applications.

(Fee is \$8 per 25 gram sample. Write Standard Sample Clerk, National Bureau of Standards, Washington 25 D.C.)

PUBLICATIONS CHECKLIST

- () Hydrofoil Seacraft, a study by the Grumman Aircraft Engineering Corp. of the feasibility of employing hydrofoils to increase ocean transport speed and comfort. 50 cents. (Write U. S. Department of Commerce, Room 6323, Washington 25, D. C. for PB 151 425)
- () Space Booster Recovery, an outline of possible methods of recovering booster systems as an economy measure in spaceflight applications. Prepared by H.H. Koelle of the Army Ballistic Missile Agency. 80 cents. (Write Order Department, ASME, 29 West 39th St., N.Y. 18, N.Y. for Paper No. 59-AV-1)
- () Guided Missileman, a training textbook prepared by the Naval Personnel Bureau covering guided missile principles and operation. 512 pages. \$1.75. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Publication D 208:11 G 94)
- () Helium, a technical survey of helium-bearing natural gases of the United States, including analyses and analytical methods. 117 pages. \$1.25. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Mines Bureau Bulletin 576)
- () Aircraft Fires, the new official U.S. Navy and Marine Corps manual on aircraft fire fighting. 372 pages. \$3. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Publication No. D 202.6/7:F 51/958)
- () Human Engineering, the proceedings of a symposium on Air Force Human Engineering, personnel and training research. 216 pages. \$2. (Write Publications Office, National Academy of Sciences, Washington 25, D.C. for NAS Pub. No. 516)
- () Gas Cooled Reactors, a compilation of papers presented at a Joint Government-Industry "information meeting" on gas cooled nuclear reactors and held at the Oak Ridge National Laboratory, Oct. 1958. Covers such topics as design, optimization, components, hazards, and fueling and the marine reactor program. (Write OTS, U.S. Department of Commerce, Washington 25, D.C. for TID 7564. 376 pages. \$3.50)
- () Mining and Petroleum, a country-by-country summary of South American mining and petroleum laws, concessions, rights of ownership, refining, transportation, exploitation, and taxation. 169 pages. \$5. (Write Division of Sales & Promotion, Pan American Union, Washington 6, D.C.)
- () Science Periodicals, a pamphlet listing new scientific periodicals received by the National Bureau of Standards since April, 1955. Also tabulates Russian publications. Helpful in technical library planning and administration. 10 pages. 10 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25 D.C. for Supplement, NBS Circular 563)

